KAWASAKI STEEL TECHNICAL REPORT
No.15 (October 1986)

Development of Dusting Prevention Stabilizer for Stainless Steel Slag

Akira Seki, Yoshio Aso, Makoto Okubo, Fumio Sudo, Kunihiko Ishizaka

Synopsis :

Stainless steel slag with a basicity of over 1.5 pulverized into fine particles during cooling in the past. Such pulverization was liable to cause environmental problems and disturbed further utilization of slag. To solve such problems, a stabilizing agent has

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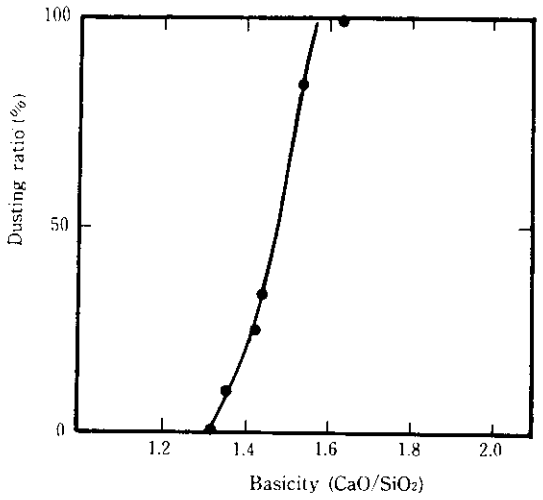

Fig. 1 Relation between stainless steel slag basicity and dusting ratio (dusting ratio (%) means pro-

Ionic radius of B^{3+}, P^{5+} and Si^{4+} in 4-coordinations:

$$B^{3+} \quad P^{5+} \quad Si^{4+}$$
$$0.22 < 0.33 < 0.4 \text{ (Å)}$$

Ionic radius of Ba^{2+}, Sr^{2+} and Ca^{2+} in 6-coordination:[6]

$$Ba^{2+} \quad Sr^{2+} \quad Ca^{2+}$$
$$1.36 > 1.16 > 0.99 \text{ (Å)}$$

(3) Addition of 5% Fe_2O_3 to form type β. However, iron oxide may change its valence number under various conditions, and one theory maintains that FeO promotes the occurrence of type γ.[7]

(4) Additions of Al and Mo to wrap $2CaO \cdot SiO_2$ with aluminate or molybdate to form type β.[8]

(5) Reduction in crystalline particle sizes by rapid cooling from high temperature without using additives to form type β.[9]

Of these methods, method (1), in which an ion of

Table 1 Chemical composition of B.O.F. and K-BOP

	Component (%)					Mineral composition
	CaO	SiO_2	P_2O_5	MgO	T. Fe	
BOF slag	40–50	10–15	2–5	2–9	15–20	$2CaO \cdot SiO_2$, $2CaO \cdot Fe_2O_3$, MgO
K-BOP						$2CaO \cdot SiO_2$

Further, a detailed analysis of line A-A′ in the SE image in Photo 1 is shown in **Fig. 3**. From the photos and the line analysis, the following was found:

(1) The mineral composition of $2CaO \cdot SiO_2$ is equivalent to Phase 1; its particle size is 20 to 40 μm.

(2) At the $2CaO \cdot SiO_2$ particle boundary, F, which

mineral composition, requires installation of exclusive-use facilities in the fur-

(3) P exists in $2CaO \cdot SiO_2$ as solid-solution of 1 to 1.5% P_2O_5, and excess P_2O_5 is enriched to the particle

nace vicinity; this is by no means easy where plant space

(a) Dusting slag

evaporation in slag with temperatures of more than 1 000°C thereby generates a tremendous amount of

changes down to a fineness modulus of 7.6 within the first 12 weeks. This lower fineness modulus was found in slag which contained significant amounts of free Cao or MgO. In any case, after being left standing in open air for three months, the samples showed no further changes. Thus it was found that slag aged for three months can be used as road construction material.

6.3.3 Unconfined compression strength

No hydration reaction occurs with γ-type $2CaO \cdot SiO_2$, a slow hydration reaction develops with the β-type. Results of the unconfined compression strength

6.3.4 Elution test

Results of an elution test of three typical samples are shown in **Table 3**. With stabilized slag like the current dusting slag, no harmful substances were detected. F content was below the effluent standard, although a certain amount of elution was observed.

7 Conclusions

As mentioned above, lumpy stainless steel slag has been obtained by the transformation of $2CaO \cdot SiO_2$ in